

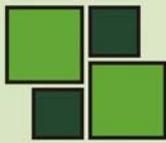
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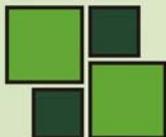
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CREDIT FLOW, OUTPUT GAP AND INFLATION: NOMINAL CONVERGENCE CHALLENGES FOR THE EU NEW MEMBER STATES

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ABSTRACT

Complementary to research on the importance of real convergence for a sustainable euro adopting process, this study analyzes the complexity of the mechanism by which credit growth may become a threat to meeting the inflation rate criterion. The added value of this approach consists of two elements. First, the analysis provides a quantitative mechanism for assessing the fundamental dependence of the output gap on credit development in the economy, econometric results of this study showing that about 15 percent of the credit flow is reflected in the deviation of economic growth from its potential level. Secondly, the study shows that macroprudential policy can contribute to meeting the price stability criterion, especially given that monetary policy instruments have limited effectiveness in countering excessive lending, econometric results showing that about 15 percent of the output gap changes into inflation in the new EU Member States. Thus, even if there are no financial stability indicators among the Maastricht criteria, at least the credit growth represents a macroprudential area with important implications on nominal convergence.

Key Words: average inflation, credit accelerator, output gap, nominal convergence, panel regressions, emerging economies

INTRODUCTION

The price stability criterion is the centrepiece of nominal convergence to the euro area of new Member States. The generalized evolution of prices is regarded as the main benchmark of the broader macroeconomic conditions and fulfilling the inflation criterion creates the premises of meeting the requirements for the other two monetary criteria, namely long-term interest rate and exchange rate stability.

Central and Eastern European (CEE) economies have made remarkable progress in economic catching up with the euro area, until the international financial crisis. But convergence with European living standards has created challenges in terms of macroeconomic stability and of external competitiveness for most of the regional economy

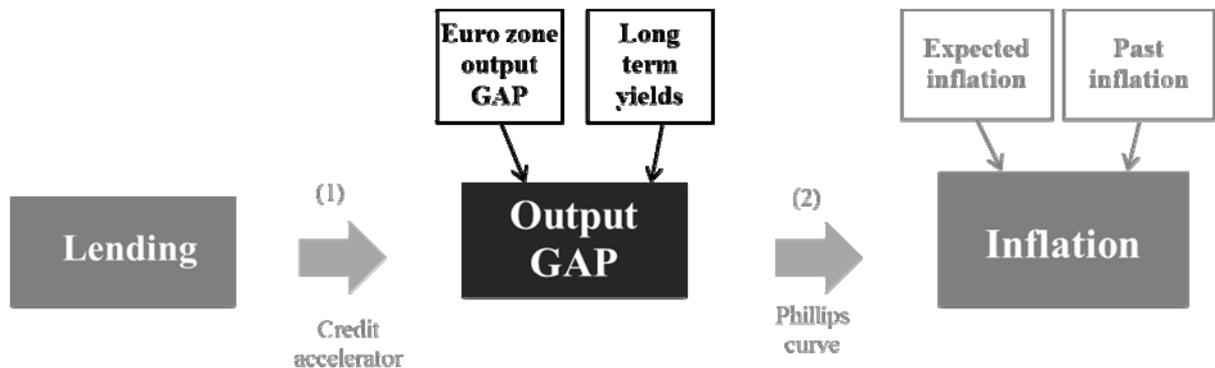
(Isarescu, 2007). While the economy was convergent in real terms, nominal parameters were evolving out of the benchmarks provided by the Maastricht treaty. Specialized literature (Egert, 2007, Lein-Rupprecht et al., 2007; Borys et al., 2008) is focused on the role of the Balassa-Samuelson effect in feeding inflationary pressures in the NMS. Alignment of wages dynamics in non-tradable sector to export tradable sector, without corresponding increases in productivity, degenerates into the rapid growth of prices, local currency depreciation and external indebtedness. However, the desire to rapidly advance and increase living standards by resorting to bank loans proved to be also part of the ingredients of the unsustainable growth of a significant number of CEE countries. **Bernanke, Gertler and Gilchrist** (1999) highlighted the role of the financial accelerator, in explaining the evolution of the U.S. business cycle, and CEE lending rate in the first decade of the new millennium provides indices of a similar phenomenon in the NMS. GDP growth above its potential level, determined by the volume and quality of the production factors of a country is the clear signal of an overheating economy, which may amplify the country's vulnerability to external shocks (**Georgescu**, 2010). Amplification of domestic consumption over internal production capacity, by resorting to bank loans, fuels the forming of a price increase spiral, masked by a pseudo convergence process. In this context, the aim of this study is to identify and assess the threats to the sustainability of the euro adoption process, associated with private sector lending. The operational objective of this research is to investigate the interrelationship between credit flow and price stability, by developing a simplified financial satellite model, integrating the credit accelerator theory with the reputed Phillips curve, in order to model the inflation rate.

The rest of the paper is structured as follows. The second section shows the underlying methodology of the analytical framework, used for assessing the risks induced by credit growth to the success of the euro adoption process by CEE, highlighting key functional forms. Section three presents the data used in the study and describes in detail both economic foundation and statistical results that lead to the selection of explanatory variables. Section four provides an overview of key empirical issues in developing a financial satellite model, favoring impact estimation, which credit has on meeting the price stability criterion.

1. METHODOLOGICAL FRAMEWORK

The international financial crisis experience has brought in foreground the role of macroprudential policy in ensuring macroeconomic stability, while the real and financial economy have become increasingly interdependent. Analytical framework to investigate the impact of credit on the evolution of inflation for CEE countries is based on a transmission mechanism with two components. The first step is the effect of lending on GDP deviation from its potential level. The second step is the Phillips curve mechanism that shapes the dynamics of prices in the economy according to the output gap, along with expected inflation (see Figure 1).

Figure 1: An X-ray of risks and vulnerabilities induced by credit growth to price stability



1.1 Credit impact on Output GAP

Transmission channel of the output gap (GAP) is based on the credit accelerator theory (Bernanke, 2007), which shows that credit flow feeds consumption and investment, creating space for multiplying the value added in the economy (see Equation 1).

$$GAP_t^i = \alpha_1 \times Credit\ Flow_t^i + \beta_1 \times GAP_t^{EE} + \gamma_1 \times LTY_{t-1}^i + C + FE^i$$

1)

The functional form of the output gap explanatory equation also includes the dependence of economic growth in the euro area (GAP_t^{EE}), the reversed relation to the long-term interest rate (LTY) as well as the structural differences between the economies of the CEE region, captured by the fixed effects of the panel estimation (FE).

1.2 Impact of output gap on inflation

Accelerating lending induces an increase over potential GDP and the economy enters into a process of overheating, which favors the generalized increase of prices in the economy.

The conceptual model for the average rate of inflation is expressed through augmented Phillips Curve expectations (see Relation 2).

$$INFL_t^i = \alpha_2 \times E[INFL]_{t+1}^i + \beta_2 \times GAP_t^i + C_2$$

2)

There is a positive relationship between the output gap and inflation ($\beta_2 > 0$). Along with the output gap, the functional form of the explanatory inflation equation includes dependence on inflation expectations for the next year ($E[INFL]_{t+1}^i$).

Expectations can be adaptive, depending only on the past history of the economy (e.g. $INFL_{t-1}^i = E[INFL]_{t+1}^i$) and rational, i.e. people form expectations based on all available information. Methodological framework of this study assumes that (see Relation 4) expected inflation is a linear combination between rational component ($E^R[INFL]_{t+1}^i$) and the adaptive inflation, ie inflation registered a year ago ($INFL_{t-1}^i$).

$$E[INFL]_{t+1}^i = \gamma_2 \times E^R[INFL]_{t+1}^i + (1 - \gamma_2) \times INFL_{t-1}^i$$

3)

Replacing the term $E[INFL]_{t+1}^i$ in relation (2) with the form described by relation (3), the explanatory model of inflation is as follows:

$$INFL_t^i = \alpha_2 \times \gamma_2 \times E^R[INFL]_{t+1}^i + \alpha_2 \times (1 - \gamma_2) \times INFL_{t-1}^i + \beta_2 \times GAP_t^i + C_2 + FE^i$$

4)

Last term in relation (5) captures the structural differences between the economies of the CEE region countries, through the fixed effects panel estimation (FE).

2. DATA

The private sector credit variable is expressed by private sector credit flow indicator (as % of GDP), provisioned in the European Commission's macroeconomic imbalance procedure. The private sector credit flow represents the net amount of liabilities (loans and securities other than shares) incurred over a year by the three sectors comprising nonfinancial corporations, households, and non-profit institutions serving households. Definitions regarding sectors and instruments are based on the ESA 1995 definitions.

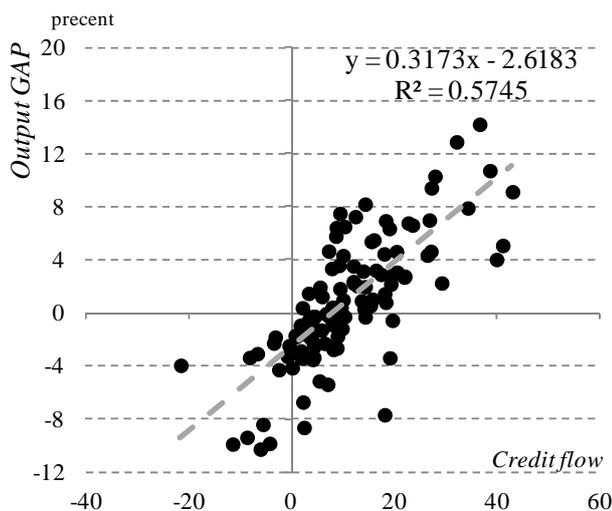
The inflation rate variable is represented by the average inflation rate HCPI, prescribed by the Maastricht criteria. Of the nominal convergence criteria, long-term interest rate has been used also.

The information underlying the assessment of the impact which credit has on inflation rates in the CEE Member States is represented by annual frequency data, covering the period 2000 to 2011. The countries under consideration are Bulgaria, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, as well as Estonia, Slovakia and Slovenia, having in mind that the last three countries were not euro zone members for the largest part of the sample.

The main source of used information is represented by Eurostat, from which were extracted data on credit flow to the private sector, average inflation rate, the number of employees in the economy, foreign direct investment and long-term interest rate. Expected inflation was extracted from the data provided by **Bojeşteanu, Manu and Leonte** (2011). At the same time, data on the output gap, both in CEE and the euro area, were extracted from the database of the European Commission (AMECO).

Preliminary empirical analysis shows that credit growth in CEE countries was one of the main determinants of economic advance over potential in the region (see Chart 1).

Chart no. 1 – Correlation between Credit flow and Output GAP

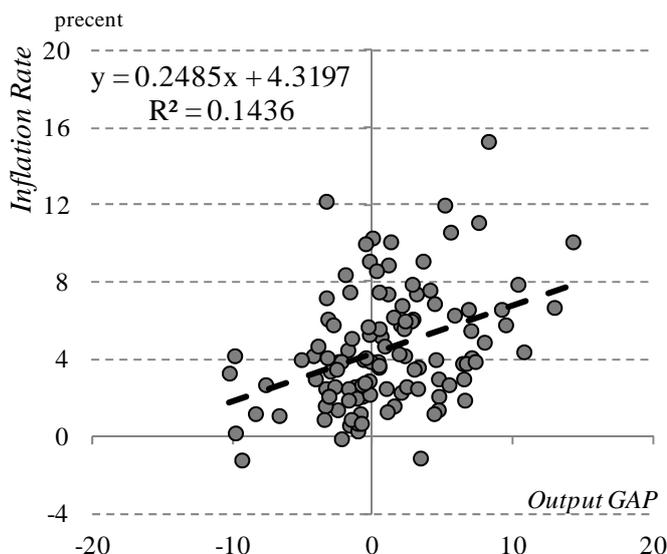


Data source: Eurostat, AMECO, authors' calculations

Univariate tests show a consistent elasticity (31 percent) of the output gap to changes in credit flow of the new EU member states area, given an explanatory power of the functional relationships of more than 50 percent.

At the same time, empirical evidence shows that CEE regional economic overheating emphasized inflationary pressures, with price increase being driven positively by Output GAP (see chart 2).

Chart no. 2 – Correlation between average Inflation Rate and Output GAP



Data source: Eurostat, AMECO, authors' calculations

Univariate assessment of the average rate of inflation dependence to economic developments indicates a significant causal linear form, both in terms of elasticity levels (about 25 percent), as well as in the degree of determination (about 15 percent). Impact occurs instantaneously.

The candidate indicators for structuring the models and their expected impact on the dependent variables together with the applied transformation are provided in Table 1.

Table 1. The candidate explanatory variables and the corresponding equations

	Explanatory variables	Expected sign
Equation 1: Output GAP		
1	Credit flow as percent of GDP	+
2	Employment (log transformation)	+
3	Foreign direct investment (log transformation)	+
4	Long term interest rate (Bond yields)	-
5	Output Gap euro zone	+
Equation 2: Inflation rate		
1	Expected inflation	+
2	Inflation registered one year ago	+
3	Output Gap	+

Stationarity of the considered indicators was tested. All indicators were I(0) after the appropriate transformation and the first difference. Furthermore, the univariate OLS regression was used to make the first selection of variables based on statistical relevance. The applied procedure tested variables on one-by-one basis up to two lags, including the contemporary impact, for each explanatory variable (see table 2).

Table 2 – Univariate analysis results for Output GAP model

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Adj - R ²	DW
Equation 1: Output GAP						
Credit flow	0.351577	0.028221	12.45816	0	0.586012	1.34881
Credit flow (-1)	0.264296	0.039767	6.646143	0	0.276665	1.226868
Credit flow (-2)	0.002375	0.059888	0.039665	0.9685	0.097596	0.947851
Employment	0.846715	0.113555	7.456444	0	0.329355	0.85025
Employment (-1)	0.749146	0.125671	5.961157	0	0.243364	1.703493
Employment (-2)	0.337582	0.165094	2.044784	0.0446	0.038895	1.108218
Foreign direct investment	0.108407	0.031475	3.44422	0.0009	0.102182	1.578448
Foreign direct investment (-1)	0.166797	0.031369	5.317258	0	0.192614	1.28342
Foreign direct investment (-2)	0.108583	0.03763	2.885578	0.0052	0.015395	1.22532
Long term interest rate	-1.412076	0.253048	5.580268	0	0.217337	1.006546
Long term interest rate (-1)	-1.576382	0.250236	-6.29958	0	0.285082	1.76229
Long term interest rate (-2)	-1.046905	0.314068	3.333376	0.0014	0.037709	1.346465
Output Gap euro zone	1.178127	0.206228	5.712736	0	0.185447	0.51413
Output Gap euro zone (-1)	0.765062	0.23664	3.233021	0.0017	0.024918	0.975025
Output Gap euro zone (-2)	-0.290836	0.289135	1.005885	0.3175	0.079081	0.862912
Equation 2: Inflation rate						
Expected inflation	0.786989	0.05736	13.72013	0	0.762095	1.78372
Expected inflation (-1)	0.584269	0.050397	11.59338	0	0.722016	1.930702
Expected inflation (-2)	0.274488	0.069351	3.95796	0.0002	0.356736	1.793194
Registered inflation (-1)	0.58124	0.050388	11.53535	0	0.702981	2.31686
Registered inflation (-2)	0.269937	0.05786	4.665357	0	0.414325	1.632486
Registered inflation (-3)	0.161149	0.058408	2.758994	0.0074	0.290837	1.44826

The lines highlighted in bold correspond to those lags with the largest explanatory power and, consequently, are short-listed for the multivariate analysis.

3. EMPIRICAL ANALYSIS

The operational objective of the empirical multivariate assessment was to substantiate the mechanism by which credit rate affects meeting the inflation rate criterion of the nominal convergence process in the countries of Central and Eastern Europe, taking into account macroeconomic factors short-listed in the previous section.

Analytical component consists of a set of simplified econometric models, built by panel estimates, using annual data.

The first equation of the financial satellite models the dynamics of **output gap**. Empirical results confirm that the dynamics of economic activity responds to the bank financing impulse, about 15 percent of the credit flow turning into output gap (see Table 3).

Table 3 – The estimated result of the output gap multivariate model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.846585	1.243641	3.093004	0.0027
Credit flow	0.149684	0.035522	4.213890	0.0001
Long term yields (-1)	-0.670829	0.156894	-4.275693	0.0001
Output GAP euro zone	1.215784	0.180672	6.729233	0.0000
Fixed Effects (Cross)				
_BG--C	-1.803072			
_CZ--C	-0.214519			
_EE--C	0.419297			
_LET--C	-0.141726			
_LIT--C	0.834303			
_HUN--C	0.061110			
_POL--C	0.026270			
_RO--C	2.660473			
_SK--C	-0.271509			
_SLO--C	-0.714372			
Adjusted R-squared	0.783031	S.D. dependent var		4.767707
Durbin-Watson stat	1.569262	Prob(F-statistic)		0.000000

Economic growth deviation from its potential level in CEE countries depends also on the output gap of the euro area, with elasticity slightly higher than one (1.21). At the same time, increase of long-term interest rates in the previous year by one percentage point leads to a compression of the output gap of around 0.7 percent. These three main drivers together explain about 80 percent of the variance of the output gap. Econometric estimates also suggest that there are some structural differences among countries in the sample in terms of the output gap, fixed effects being statistically significant. These structural differences are not, however, major, as re-estimation of the model without fixed effects leads to a similar result, while the fitting performance is only marginally reduced (to 0.75).

We perform additional checks to determine whether a) macroeconomic variables other than those included in our specification are important, and b) parameter estimates are stable within the sample of countries. Both foreign direct investment and employment were not statistically relevant whenever credit growth variable was present into functional form. Moreover, stability tests confirm that the estimated model represents a fairly robust specification, although the fitting performance went slightly below 75%.

The result of estimating the **average rate of inflation** equation shows that supplying economic growth above potential, through an impulse is instantly accompanied by generalized increase of prices in the economy, the Phillips curve model being relevant also in CEE economies. Slightly over 15 percent of the economic growth dynamics deviation from its potential level materializes in the actual average inflation rate (see Table 4).

Table 4 – The estimated result of the inflation rate multivariate model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.725957	0.314442	2.308715	0.0231
Expected inflation	0.416021	0.074399	5.591745	0.0000
Inflation registered one year ago	0.375217	0.059839	6.270428	0.0000
Output GAP	0.164511	0.048749	3.374635	0.0011
Fixed Effects (Cross)				
_BG--C	0.021088			
_CZ--C	0.102567			
_EE--C	-0.141943			
_LET--C	1.004068			
_LIT--C	-0.808419			
_HUN--C	0.196495			
_POL--C	-0.024209			
_RO--C	-0.284649			
_SK--C	-0.086447			
_SLO--C	0.021450			
Adjusted R-squared	0.804468	S.D. dependent var		4.533256
Durbin-Watson stat	2.526991	Prob(F-statistic)		0.000000

At the same time, inflation expectations for a time horizon of one year are also relevant, with a positive coefficient (0.41), statistically significant for a probability of one percent. The levels of statistic tests are indicative of the fact that the set of models observe the requirements of good econometric performance. Coefficients are statistically significant and their signs are in line with economic intuition. Estimated multifactorial functional form manages to capture about 80 percent of the variance of the average rate of inflation, by also taking into account, through fixed effects, slight structural differences existing in terms of price stability. The relatively low level of structural coefficients, together with the fact that the changes caused by testing the functional form in the absence of fixed effects are insignificant, conclude that there are only marginal structural differences between the new Member States, in terms of the Phillips curve's ability to shape price developments in the economies.

CONCLUSION

The innovative character of this study is to highlight the capacity of the private sector credit flow indicator, provided by the new procedure of the European Commission, related to macroeconomic imbalances, to explain a significant part of both the output gap, as well as the inflation rate recorded in the countries of Central and Eastern Europe, in the pre-and post-crisis.

The added value of this approach consists of two elements. First, the analysis provides a quantitative mechanism for assessing the fundamental dependence of the output gap on credit developments in the economy, with econometric results of this study showing that about 15 percent of the credit flow is reflected in the economic growth deviation from its potential level. Secondly, the study shows that macroprudential policy can contribute to meeting the objective of price stability, especially given that monetary policy instruments have limited effectiveness in countering excessive lending, amid full liberalization of the capital account. Excessive lending induces a process of overheating the economy, favoring a generalized increase in prices. The econometric results show that about 15 percent of the output gap turns into inflation. Not even the scenario where financing the economy enters a downward slope is without risks to price stability, given that the reduction in revenues due to a negative output gap is not accompanied by a similar adjustment in expenditures. In such a context, there is strong pressure on government deficit and inflation rate can record significant growth, fuelled by the inevitable increase of indirect taxes such as value added tax.

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A QUANTITATIVE ANALYSIS OF THE RESOURCES FOR E-LEARNING IN ROMANIA¹

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ABSTRACT

Information and Communication Technologies have been the main drive behind changes within society and economy for more than a decade. A European Information Society for growth and employment is a strategic framework for the information society.

Widespread access to the Internet is essential for the development of advanced services in the field of e-business, e-government, and e-learning. The resources for the development of e-learning in Romania are very low compared to the other countries in the EU. Romania belongs in a cluster with Bulgaria and Greece, which group is last on almost all the indicators in the present study.

Keywords: *Information and Communication Technologies, resources, e-learning, infrastructure.*

1. INTRODUCTION

Information and Communication Technologies (ICT) are considered to be critical for the demands of the European society and economy. The i2010 initiative, "a European information society for growth and employment" became the policy framework for ICT, which seeks to increase the efficiency of the European economy by means of wider use of ICT². The initiative is designed to promote a competitive digital economy, to research information and communication technologies, as well as their application in improving social inclusion, public services and quality of life. In this context, the use of IT in education is an important way of increasing economic growth and of reducing poverty, as it is well known that "education and training are the most important investments in human capital"³.

As Peter Drucker said, "thanks to the Internet, adult education may become our⁴ single largest industry"⁵. An e-learning system implies the development and integration of new technologies in the educational environment. In higher education, e-learning is the fastest-growing technology application. Thus, designing and implementing ICT policies and strategies requires proper knowledge of the state of ICT and its use by organizations and individuals. This is necessary mainly to identify the main barriers to the use of ICT in education. Consequently, the measurement of e-learning access and use enables assessment of the digital divide within a country and among countries.⁶

During the last decade, information and communication technologies have become widely available to most people. The study of the accessibility involves taking into consideration of both the infrastructure and the content. In terms of resources, the accessibility for individuals is measured by the following indicators: households with

broadband access, households having access to the Internet at home, level of Internet access, broadband access, broadband penetration rate, IT expenditure, computer skills and Internet skills, individuals regularly using the Internet, individuals doing specific online activities in the previous 3 months, reasons for not having Internet access at home, Reasons for not having broadband access at home, places for accessing Internet, computer use by individuals.

While ICT have become available to a wider public, there remains a gap between users and non-users, often referred to as the 'digital divide'. This may be attributed to a number of factors, including: a lack of infrastructure (particularly in rural areas), or a lack of computer and Internet skills necessary to take part in the information society, or a lack of interest in what the information society can offer. The present paper analyses the first two factors, which are resources for e-learning development in Romania according to the European Union framework.

2. DATA AND METHOD

The study is based on the data from the Eurostat 2009 survey on the use of information and communication technologies in households and by individuals. Survey on ICT usage in households and by individuals in Romania in 2009 was conducted by the National Institute of Statistics.

Households in this survey are defined in terms of those households with at least one member in the age group 16 to 74 years old. The instrument for collecting data was individual questionnaires for people 16-74 years old who use or have used internet and/or computer. From a population of 7 395 749 households a sample of 8332 households was selected. The household survey conducted by the Romanian National Institute of Statistics is based on the use of a master sample EMZOT. EMZOT is a Multifunctional Sample of Territorial Areas, made by the data registered from Population and Dwelling Census in 2002.⁷

In this study, we considered the following variables: percentage of households having access to the Internet at home, percentage of households having broadband access, broadband penetration rate, IT expenditure as percent of the GDP, computer skills, Internet skills, and the percentage of individuals who used Internet, in the last 3 months, for training and education. The values are for 2009. Data were analyzed using statistical methods, namely descriptive measures, inferential methods, and multivariate methods.

3. RESULTS

The access to the Internet of households is measured as percentage of households with at least one member aged 16 to 74, where any member of the household has the possibility to access the Internet from home. In Fig. 1, we can see that Romania is among the last three countries, with a value of Internet access of 38%, comparing with EU average of 63%. The highest value was registered in Netherlands, with a 90% level of Internet access.

Broadband⁸ technologies offer users the possibility to rapidly transfer large volumes of data and to keep their access line open. They are considered to be of major importance

when measuring access and use of the Internet. Widespread access to the Internet via broadband is seen as essential for the development of advanced services on the Internet in the field of e-business, e-government, and e-learning. The availability of broadband is measured by the percentage of households that are connectable to an exchange that has been converted to support ADSL or xDSL-technology, to a cable network upgraded for Internet traffic, or to other broadband technologies. In almost all EU Member States, broadband was the most common form of Internet access (an average of 49 % of all EU-27 households in 2008 compared with 11 % of households that used dial-up access or ISDN access), the exception being Romania⁹. In Romania, only 24% of the households have broadband access, while in EU the average was 55%, and in Sweden, the value was 79% (Fig. 2).

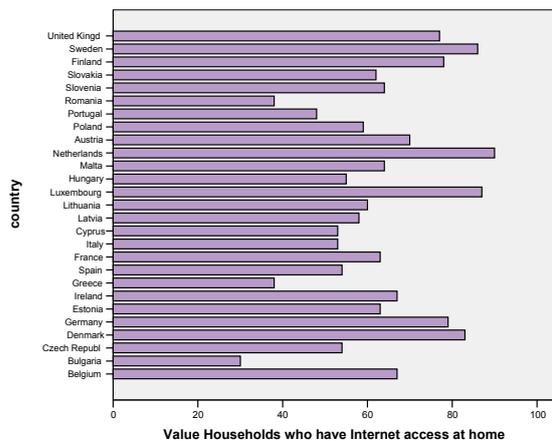


Fig. 1 Internet access

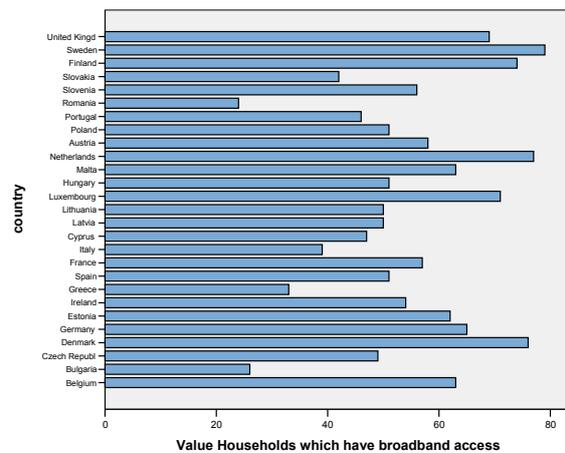


Fig. 2 Broadband access

The broadband penetration rate describes the number of high-speed connections per 100 inhabitants. The number of broadband access lines per 100 inhabitants in Romania was 12,30, while in the EU there were 23 broadband access lines per 100 inhabitants (Fig. 3).

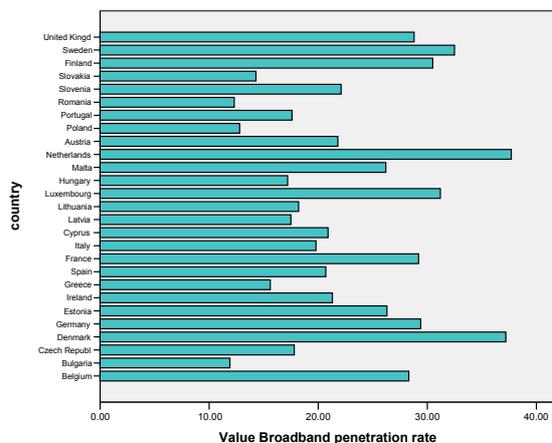


Fig. 3 Broadband penetration rate

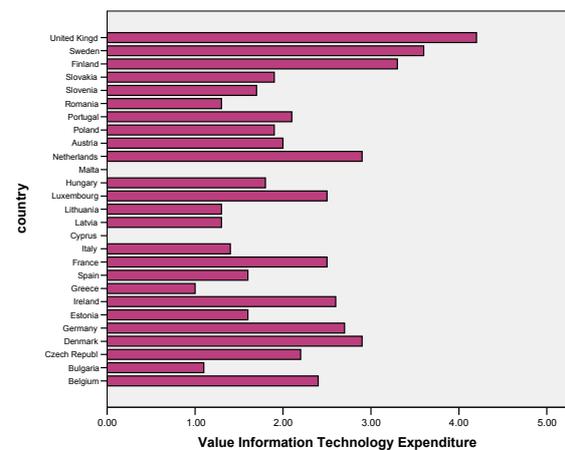


Fig. 4 IT expenditure

Information Technology expenditure is expenditure for IT hardware, equipment, software and for other services as a percentage of the GDP. The lowest level was registered in Bulgaria (1.10%), followed by Lethonia, Lithuania, and Romania (1.30%), and Italy (1.40%). In UK the highest value of percentage of GDP of Information Technology expenditure was registered, of 4.20% (Fig. 4).

Beside the technical infrastructure, important resources for e-learning development are computer skills and Internet skills. The level of basic computer skills and that of Internet skills have been measured using a self-assessment approach, where the respondent indicates whether they have carried out specific tasks related to computer use and Internet use. The computer skills used are: copy or move a file or folder; use copy and paste tools to duplicate or move information within a document; use basis arithmetic formula (add, subtract, multiply, divide) in a spreadsheet; compress files; connect and install new devices, e.g. a printer or a modem; write a computer program using a specialized programming language. The computer-related items are: Low level of basic computer skills (Individuals who have carried out 1 or 2 of the 6 computer-related items); Medium level of basic computer skills (Individuals who have carried out 3 or 4 of the 6 computer-related items), and High level of basic computer skills (Individuals who have carried out 5 or 6 of the 6 computer-related items). We noticed that the lowest level was registered in Romania (10%), and the highest level was registered in Denmark and France (35%) (Fig. 5).

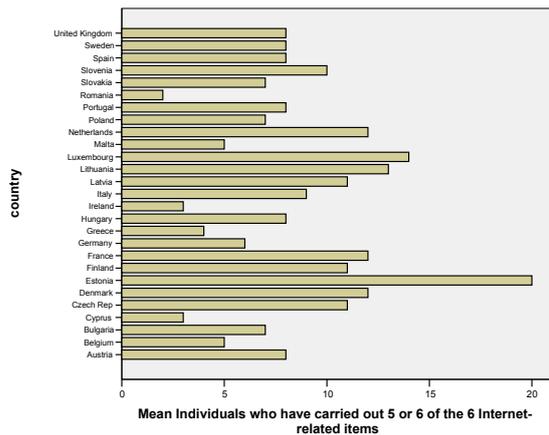


Fig. 5 High level of basic computer skills

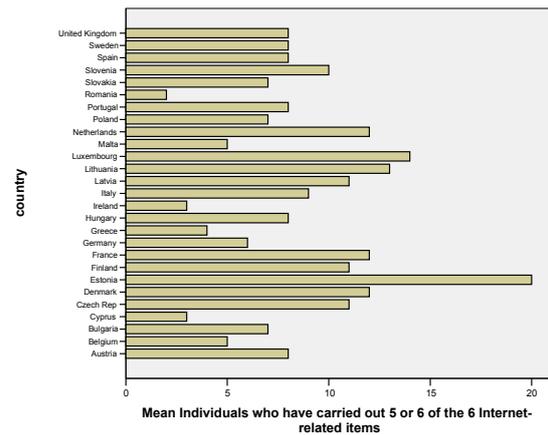


Fig. 6 High level of basic Internet skills

The Internet-related items used to group the respondents into 3 levels of Internet skills are: use a search engine to find information; send an e-mail with attached files; post messages to chat rooms, newsgroups or any online discussion forum; use the Internet to make telephone calls; use peer-to-peer file sharing for exchanging movies, music etc.; create a web page. The levels of Internet skills are: Low level of basic internet skills (Individuals who have carried out 1 or 2 of the 6 Internet-related items), Medium level of basic internet skills (Individuals who have carried out 3 or 4 of the 6 Internet-related items), High level of basic internet skills (Individuals who have carried out 5 or 6 of the 6 Internet-related items). Data reveals that the highest value was registered in Estonia - 20%, and the lowest one in Romania, - 2% (Fig. 6).

Another indicator of the e-learning resources is the frequency of Internet use; it has been measured by the percentage of individuals who accessed the Internet every day or almost every day within the last three months on average. Romania is on the last position,

with a value of 31% of individuals who accessed the Internet every day or almost every day within the last three months on average, while the European average was 60% (Fig. 7).

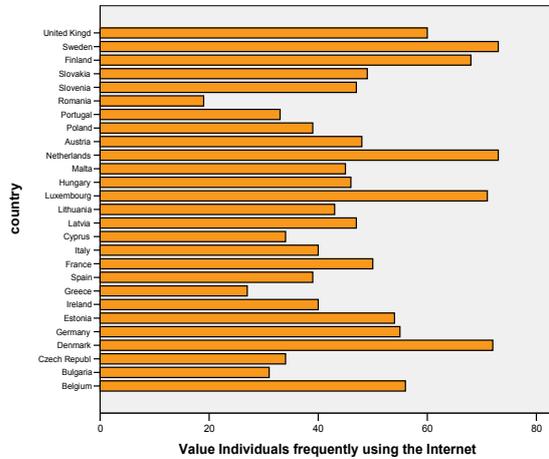


Fig. 7 The frequency of Internet use

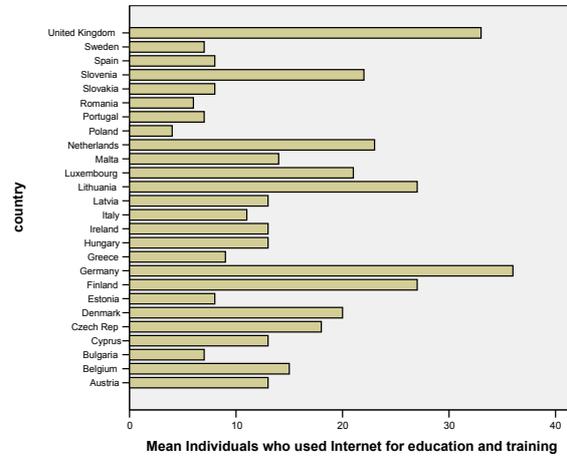


Fig. 8 Individuals who used Internet for training and education

There are also important differences among countries regarding the percentage of individuals who used the Internet for training and education in the past 3 months, from 4% in Poland, 6% in Romania, to 36% in Germany¹⁰ (Fig. 8).

Hereinafter, we aim to allocate the set of EU-27 countries to a set of mutually exclusive, exhaustive groups with cluster analysis. We measured five variables on each country: percentage of households who have Internet access, percent of individuals who frequently use the Internet, percent of GDP of IT expenditure, percent of individuals who have carried out 5 or 6 of the 6 Internet-related items, and percent of individuals who have carried out 5 or 6 of the 6 computer-related items. Five groups of homogenous countries were identified concerning the resources for e-learning development. The group with the lowest values for all the indicators under study is cluster 2 and it contains the countries: Bulgaria, Greece, and Romania. The group labels may provide a concise description of patterns of similarities and differences in the data. This cluster is characterized by the following average values: 35% of households have Internet access, 26% of individuals frequently use the Internet, 1.13% of GDP is for IT expenditure, 4% of individuals have carried out 5 or 6 of the 6 Internet-related items, 14% of individuals have carried out 5 or 6 of the 6 computer-related items (Table 1). Also, the countries that form cluster 2 are characterized by high unemployment rate (Bulgaria – 7.8%, Greece – 10.2%, Romania – 7.6%), low values of the percentage of the population aged 25 to 64 having completed at least upper secondary education (Bulgaria – 77.5%, Greece – 61.1%, Romania – 75.3%). At the other end are countries that form cluster 4, with the highest levels. This cluster contains the following countries: Denmark, Luxembourg, Netherlands, Finland, and Sweden.

Table 1 Final Cluster Centers

	Cluster				
	1	2	3	4	5
Households who have Internet access at home	62	35	56	85	73
Individuals frequently using the Internet	49	26	39	71	55
Information Technology Expenditure	1.80	1.13	1.86	3.04	2.83
High level of basic Internet skills	12	4	8	11	7
High level of basic computer skills	26	14	19	30	29

Source: author's calculations

For the validating of cluster solution we performed a discriminant analysis. For finding the variables that have significant contributions to group differences, we used F statistic (Table 2). The F statistic is a ratio of between-groups variability to the within-groups variability. Small values of Wilks' Lambda and also small significance value indicate strong group differences.

Table 2 Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
Households who have Internet access at home	.076	60.595	4	20	.000
Information Technology Expenditure	.207	19.142	4	20	.000
Individuals who have carried out 5 or 6 of the 6 Internet-related items	.614	3.140	4	20	.037
Individuals who have carried out 5 or 6 of the computer related activities	.152	27.931	4	20	.000

Source: author's calculations

Table 3 displays eigenvalues, the percentage of variance, the cumulative percentage, and canonical correlations for each canonical discriminant function. An eigenvalue indicates the proportion of variance explained. A large eigenvalue is associated with a strong function.

Table 3 Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	39.245(a)	95.8	95.8	.987
2	1.211(a)	3.0	98.7	.740
3	.492(a)	1.2	99.9	.574
4	.029(a)	.1	100.0	.168

a First 4 canonical discriminant functions were used in the analysis.

Source: author's calculations

The first canonical variable accounts for 95.8% of the total dispersion. The canonical correlation measures the association between the discriminant scores and the groups. The value of .987 indicates a strong correlation between the discriminant scores and the groups. The discriminant function classifies correctly all the UE-27 countries. We can conclude that the variables selected differentiate the five clusters significantly, from the point of view of the e-learning resources.

5. CONCLUSIONS

Data revealed that, in Romania, the accessibility to computers and the Internet is very low compared to the other European countries. Poor infrastructure raises the problem of the access to education through e-learning. Widespread and affordable broadband access is one of the means of promoting the knowledge based society.

Romanian education institutions began to include new technologies in their development agenda 15 years ago. Several initiatives are trying to keep up with the European and global eLearning trends, principles and actions, focusing on the acquisition of IT equipment and their administrative usage and shifting towards appropriate education software integration and human resource training¹¹. The Internet became an addition to the education process. Nowadays, most of Romania's efforts in the area of e-learning are directed towards the educational use of ICT.¹²

In Romania, the improvement of school infrastructure and the connection of educational institutions to the Internet have been the goals of two major programs: SEI (Education IT-based System) and RoEduNet (extending the Romanian educational information network). Beside these programs, initiatives and projects aiming to support the innovation in education were undertaken by various institutions and individuals. In higher education the level of implementing the new learning technologies and up-to-date ICT infrastructure is quite high, mainly due to the involvement of Romanian higher education institutions within European and international projects in the field of technology-enhanced learning. 58% of Romanian universities use e-learning solutions in their activity.

The information technology will have a stimulating role for education only if it is rationally introduced¹³. It has to be understood that the introduction of new cyberspace technologies requires a special approach, which is inter-disciplinary par excellence.¹⁴ But, in Romania, education and the training systems are not yet adequately prepared. Their readiness must be considered in terms of institutional capacity, properly trained staff and access to technology. Using e-learning systems means that more individuals are able to use ICT, and they have access to the technical infrastructure to do it.

The social and economic potential of the Internet in the future is based on the premise of Internet available to all. IT resources are key dimensions of an e-learning framework. The real impact of evolving technologies upon education and training systems, as most of the researches envisage, refers to the shift in considering education for all, consisting in the empowerment of individualized instruction, stimulation of creative potential and cognitive skills for future knowledge-builders, development of competences and skills for life-long learning¹⁵.

ACKNOWLEDGMENT

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¹ This paper is a result of the research done as part of the project PN II Ideas 2105.

² *Europe in figures — Eurostat yearbook 2010*, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-CD-10-220/EN/KS-CD-10-220-EN.PDF, 396.

³ G. S. Becker, *Capitalul uman*, Editura ALL, Bucuresti, 1997, 17.

⁴ This is for USA but can be extended globally.

⁵ P. Drucker, *Forbes Magazine*.

⁶ *Manual for the Production of Statistics on the Information Economy*, United Nations Conference on Trade and Development, 2007, http://www.unctad.org/en/docs/sdteecb20072_en.pdf, 5

⁷ www.insse.ro

⁸ Broadband lines are defined as having a capacity equal to or higher than 144 kbit/s.

⁹ *Europe in figures — Eurostat yearbook 2010*, 400.

¹⁰ Data are registered in 2006.

¹¹ O. Istrate, *eLearning in Romania: the State of the Art*, eLearning Papers, No 5, 2007, p.1.

¹² O. Istrate, *eLearning in Romania: the State of the Art*, eLearning Papers, No 5, 2007, p.14.

¹³ G. Valeanu, *Tehnologia informatiei si cultura organizationala*, Ed. Junimea, Iasi, 2004, p. 39.

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¹⁵ O. Istrate, *eLearning in Romania: the State of the Art*, eLearning Papers, No 5, 2007, p.14.

AN EMPIRICAL ANALYSIS ON PREFERRED SAVING INSTRUMENTS BASED ON THE ENQUIRY “FINANCIAL SITUATION OF THE ROMANIAN HOUSEHOLDS”

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Abstract:

Keeping pace with the changing times and under the liberalized financial sector regime, the financial-banking institutions developed a new range of financial instruments that offer multiple saving opportunities.

But, this innovative and diversified financial-banking system was not able to attract the population away from the traditional methods of saving.

Pertinent results in the analysis of savings instruments that households resort to may be quickly obtained with the help of data from selective studies. To this purpose, the aim of this paper is to highlight some particularities of preferred saving instruments of the Romanian households, starting from the results of an enquiry that took place during 1-15 May 2012 on a sample of 1728 respondents, constituted with quota sampling.

The study reveals that cash and bank savings still remain the most preferred methods of the households. The results also highlight that certain factors like financial education level, trust about the financial-banking system or the residence area have a significant impact on decisions regarding saving methods.

Key words: saving instruments; financial education level; logistic regression

INTRODUCTION

The empiric approach of the households saving behaviour is usually done in two plans: macroeconomic and microeconomic (individual).

Orienting the population towards various saving instruments may only be approached from the microeconomic (individual) perspective. Few studies assess the behaviour of saving at the individual level generally due to the lack of data. The microeconomic approach, through surveys or enquiries, allowed for the identification of those characteristics of the households that influence the saving behaviour.

The literature on saving behaviour is vast. Most studies highlight the considerable heterogeneity of the households' reasons for saving (Abdelkhalek et al., 2009, Alessi & Lusardi, 1997, Browning & Lusardi, 1996).

The literature indicates a large number of reasons for household saving. The following major motives leading to such a decision can be distinguished (Sturm, 1983):

- **Retirement saving.** Generally considered the most important reason for saving, it is the basis of the Life Cycle Hypothesis (LCH). Savings are positive during the pre-retirement phase and negative after retirement.

- **Precautionary saving.** In the basic LCH model the household bases its decision on events the dates and magnitudes of which are assumed to be known (the future income, the time of death and the interest rate in each period). But in reality future events are uncertain and individual behaviour will be modified. Individuals seek to save for security, regardless of the life cycle stage they are in.

- **Saving for bequest.** Up to a certain degree this reason cannot be precisely differentiated from precautionary saving. An amount saved currently may simultaneously serve as a precautionary life-cycle function (guarding against future contingencies such as health shocks or other emergencies) and a bequest function because, in the likely event that the money is not absorbed by these contingencies, it will be available to bequeath to children or other worthy causes. However, a bequest motive changes the size of the saving ratio only in an economy expanding due to population growth, productivity growth or both.

- **Target saving.** We are referring especially to saving with the view to buy durable goods, but also for expenses caused by special events, holidays or education.

After investigating the savings behaviour of households, Lindqvist (1981) developed the saving motives hierarchy, as displayed in Figure 1, to describe the order in which households acquire financial products.

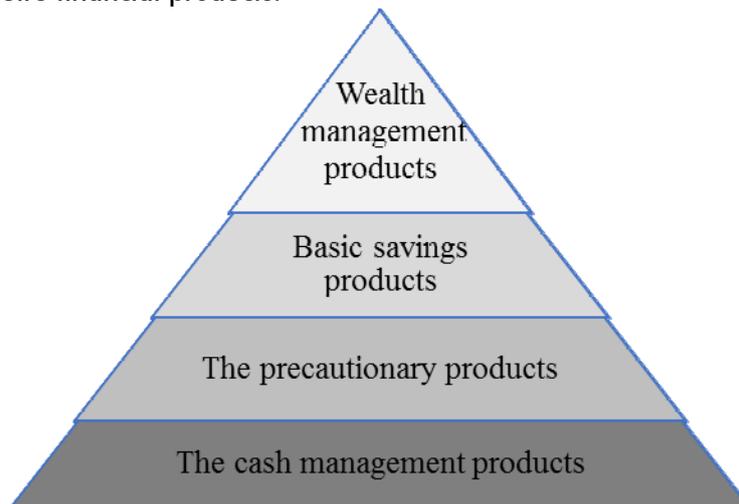
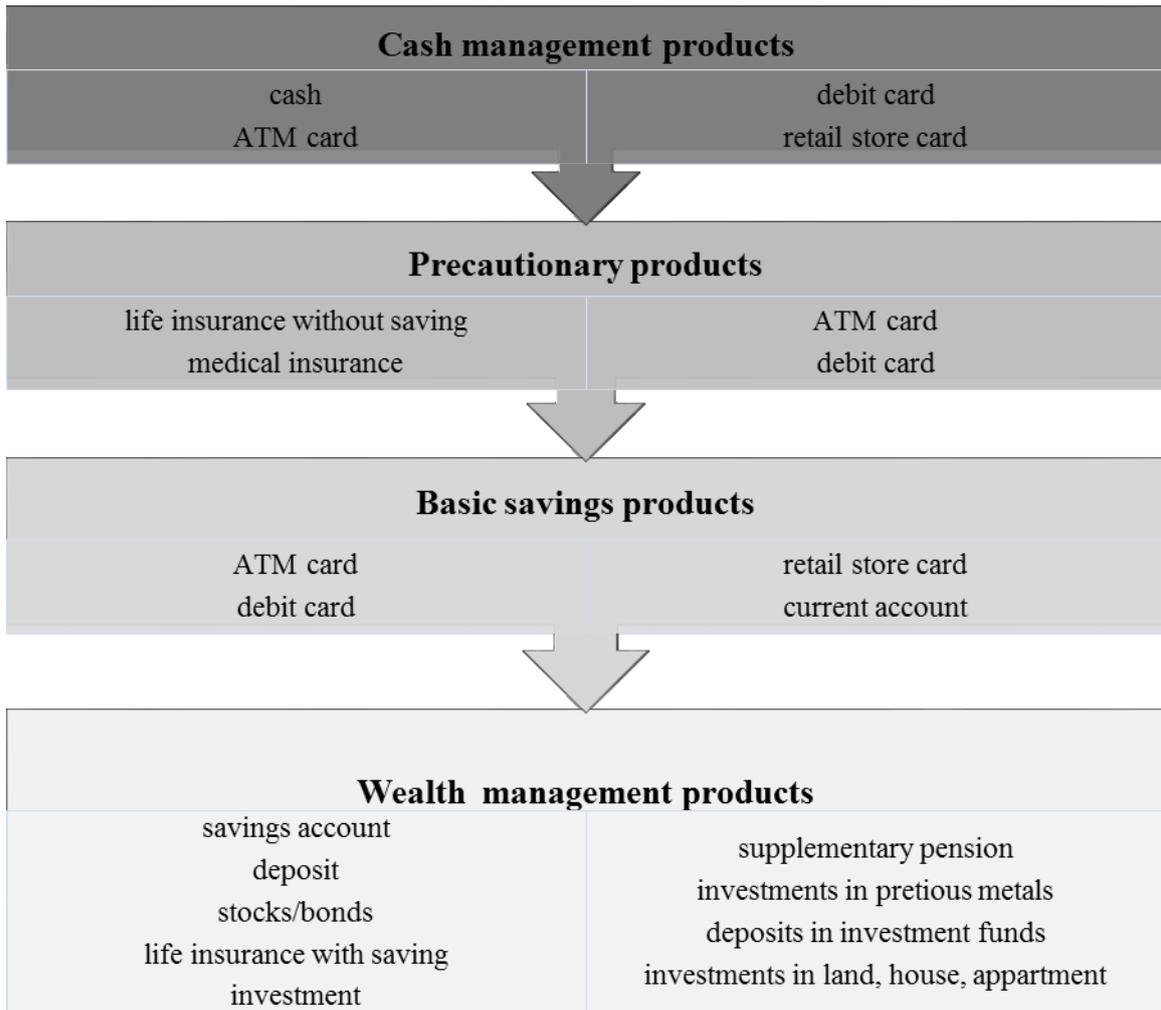


Figure 1: Saving motives hierarchy

For each level of the pyramid, the needs are ensured using specific financial instruments. The cash management products include payments for current, short-term expenses. The precautionary products refer to instruments used by the households for having a financial reserve in case of unexpected expenditure. Basic saving products include accumulation of financial deposits for buying a house, a car or durable goods, and wealth management products comprise financial instruments used by households with the view to earn returns (profit, interest).

Using the Lindqvist saving motives hierarchy, factors influencing movement from a lower to a higher level in the hierarchy were investigated by DeVaney, Anong and Whirl (2007). The authors concluded that there were three very important factors relevant to all four levels of the savings hierarchy: the age of the household head, the size of the family and the length of the planning horizon influencing the acquisition of financial products. Based on the principles of Lindqvist's model, Venter and Stedall (2010) developed a South African financial product usage hierarchy. By adapting the scheme proposed by Venter and Stedall for the financial market in Romania, we obtained the hierarchy of financial products usage presented in Figure 2.



Source: Adapted from Venter & Stedall (2010)

Figure 2: Financial product usage hierarchy

Depending on the saving behaviour and the financial situation, each household may shift or not from a hierarchic level to another. However, the instruments used for the higher levels of the pyramid require information and a high level of general and financial education.

The findings that individuals are uninformed about the most important components of their total savings and lack basic financial knowledge would not be so troubling if individuals relied on professional advice and financial experts to make their saving decisions. In fact, only a small fraction of households consult financial advisers, bankers, certified public accountants, and other professionals, while the majority of households rely on informal sources of advice (Lusardi 2008).

This situation leads to the widespread use of the classic saving instruments (bank deposits) or, even worse, if lack of financial education is associated with lack of trust in financial institutions, savings in cash. In South-eastern European countries more than 50% of the respondents report to prefer cash over bank deposits (Sixt 2012).

The financial institutions aim at attracting savings in cash into the banking system.

This implies an improvement in the image of the banking system and financial education of the population. The objective of financial education is to raise financial literacy levels by teaching new knowledge, skills and attitudes that can bring about changes in money management behaviours. It is also a tool of financial inclusion, enabling people to take greater advantage of the financial services available to them.

The interests by scholars and policy-makers in Europe and in the US on the determinants of financial literacy and on the link between financial literacy and savings has been constantly increasing in the last years and some institutions, such as the OECD, the U.S. Treasury Department and the Bank of Italy, have expressed the need for improved financial knowledge among European and US citizens, emphasizing the role of formal financial education in schools or at the workplace. (Fort et al.,2012)

RESEARCH METHODOLOGY

The paper aim is to highlight the preference for certain saving instruments of the Romanian households and to outline the factors playing a decisive role in deciding for one saving method or another.

The data come from an enquiry that took place during 1-15 May 2012 on a sample of 1728 respondents, constituted with quota sampling.

In designing the questionnaire, the following objectives were followed: assessing the financial situation and the saving capacity of the households; identifying the main saving reasons and preference for various saving instruments.

Starting from the empirical studies focusing on the analysis of the saving behaviour, I advanced the following hypotheses:

1. Preference for classical financial products. The lack of financial education of the population determines the placement of savings in banks, the main option being bank deposits.
2. An important part of the households (at least 50%) resort to cash savings.
3. Those using modern savings instruments have a high level of general and financial education.

ANALYSIS OF ENQUIRY RESULTS

The data resulted from the enquiry were centralised in a database that was verified for completeness of the information. Partial non-responses were treated through methods of imputation with mean or median of nearby observations, formed with the help of auxiliary variables. The obtained database was processed using SPSS, with the view to allowing for a complex analysis of households saving behaviour.

Preference for Various Saving Instruments

There is an alarmingly high proportion of households that save in cash (74%). Moreover, among those who chose to save in cash, 41.7% in 2012 only use this saving method. The banking system instruments (saving accounts, deposits, and current accounts) are used by 51% of the households. The lack of financial education makes the other saving instruments quite unattractive, only 39% resorting to other methods than the classical ones.

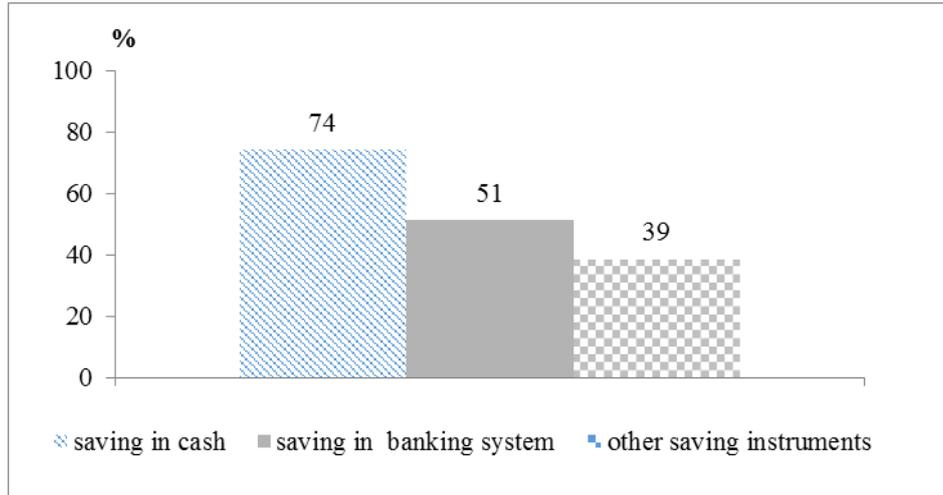


Fig. 3 Preference for saving instruments

The high percentage of those who prefer to keep their money “under the mattress” is determined by the lack of confidence in the banking system and the other financial institutions.

Among those who save only using this method, 73% declared that the main reason they chose it is the security that they will not lose their money. The average score given (on a scale from 1 to 5) for the security of financial-banking saving instruments is 2.26, as compared to saving in cash, which they evaluate at 3.7.

Regarding the profitability of savings in the banking system and other financial institutions, this is appreciated as weak (below 2.2 for both methods). These saving instruments are not perceived as having a higher profitability than saving in cash.

The profile of the respondent who prefers to keep their money in cash is given by a number of demographic and socio-economic characteristics:

- Lives in the rural area – above 41% of the respondents in rural area rather keep their money in cash, as compared to only about 31% in the urban area ($\chi^2 = 5.4$, there is a 0.98 probability that the variable residence area influences the preference for saving in cash only).
- Has a low education level – approximately 49% of those without higher education keep their savings in cash, as compared to 20% of those with higher education ($\chi^2 = 47.5$, there is a 0.9999 probability that the level of education influences the preference for saving in cash only).

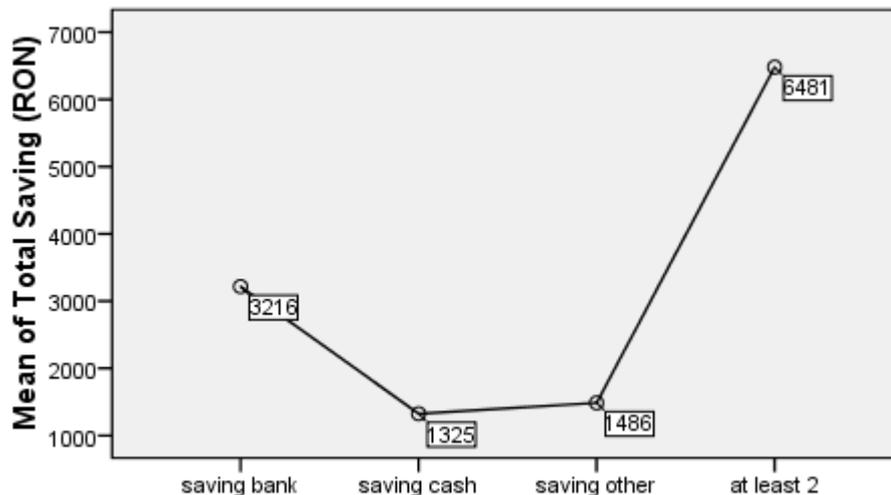


Fig. 4 Average amount saved by saving instrument

As may be seen in Figure no 4, the households that opt to keep all their savings in cash have the smallest saving potential (on average 1325 RON). The hypothesis of the equality of means for savings with various instruments was rejected for a probability of 0.9999.

Households that have an increased saving capacity (on average 6521 RON) mainly use a wide range of financial instruments for saving.

The gender and the age of the household head do not have statistically significant influence.

Identifying the Profile of the Modern Saving Instrument Users

Next, the analysis focuses on the identification of the characteristics of the 39% who use modern saving instruments (shares/bonds, life insurance with saving component, private supplementary pension, investment in real estate, deposits in investment funds). To this aim I used the logistic regression model.

The dichotomy dependent variable is “saving with modern instruments”, having the following possible answers:

0 NO	The household does not use modern instruments
1 YES	The household uses modern instruments

The independent variables of the regression model are:

NoPrGoods=number of goods owned by the household. Numeric variable that quantifies the assets of the household. These goods may be: main dwelling, second dwelling, lands, forests, garages, offices, commercial spaces, livestock, cars and agricultural machines.

NoBankProd=number of banking products used. Numeric variable that quantifies financial knowledge, ability. The banking products used may be: debit card, real estate or personal need credit, dwelling credit, current account, saving account or deposit, overdraft, internet banking, telephone banking, mobile banking).

ProfOther=perception on profitability of saving through modern instruments (on a scale from 1 to 5)

No_inc_mb=number of income earning household members

RiskType=the type of risk. Nominal variable. Categories: 1. Big return-high risk, 2. Good return-low risk and 3. Low return-minimum risk

ResidenceArea=nominal variable. Categories: 1. Urban; 2. Rural

FSPY=financial situation compared to previous year. Dichotomy variable: 1. Financial situation of the household improved, 0. Financial situation of the household did not improve.

The coefficients of the logistic regression model are presented in Table no.1. Their significance was tested using the Wald test. The percentage of the cases correctly classified is 77% and Nagelkerke R² is 0.34. It may thus be said that the model adequately fits the data.

The influence of demographic and socio-economic characteristics

The variable “number of income earning household members has a direct influence, determining, for an increase of 1 member, a 1.08 times increase of the odds that the household uses modern financial instruments.

The situation of the household assets also has a positive influence on the propensity to use modern saving instruments. The increase in the number of goods in the household by one, the odds of using modern financial instruments increase 1.352 time.

Table no.1. The coefficients of the logistic regression model

	B	S.E.	Wald	df	Sig.	Exp(B)
No_inc_mb	,077	,031	6,287	1	,012	1,080
NoPrGoods	,302	,059	26,215	1	,000	1,352
NoBankProd	,169	,050	11,590	1	,001	1,184
ProfOther	,408	,096	18,197	1	,000	1,504
FSPY	,642	,202	10,120	1	,001	1,899
RiskType			12,001	2	,002	
RiskType (Big return-high risk)	1,023	,307	11,118	1	,001	2,782
RiskType (return-low risk)	,337	,167	4,068	1	,044	1,400
ResidenceArea (Urban)	,633	,176	12,966	1	,000	1,884
Constant	-3,618	,476	57,864	1	,000	,027

The reference category for the nominal variable “ResidenceArea” is “Rural”. The influence of this variable is the expected on. The odds for those living in the urban area to use modern saving instruments are 1.884 times higher than those of the reference category.

The households that evaluate their financial situation to be better than the one in the previous year are more active on the financial market, their odds for using modern financial products being 1.889 times higher than those of the households which have the same or a worse financial situation.

The influence of education

The education level of the household head does not have significant influence on the propensity of the household to use modern financial instruments.

Regarding the abilities on the banking market, using more banking products increases the odds of using modern financial instruments 1.184 times.

Furthermore, those who perceive the profitability of saving through modern methods as being high, have 1.5 times greater odds of using these instruments.

The influence of personality

According to the type of personality of the individual, they can take a bigger or a smaller risk when opting for a certain saving instrument. The reference category of the variable “RiskType” is “low return, minimum risk”. As compared to this category, the persons who appreciate their saving or investing risk taking as “good return, low risk” have 1.4 times more odds to resort to modern instruments. Those who prefer to take high risks in order to obtain high returns have a 2.782 times larger propensity to use modern financial instruments.

Association of the Saving Reasons and Saving Instruments

Starting from the saving motives hierarchy I intended to identify the saving instruments used for each stage. The first stage in the hierarchy (the cash management products) was not included in the analysis because data regarding it were not collected. We considered that the management of current expenses of the household is not comprised in the saving issue.

As may be seen in Figure no. 5, saving in cash is the preferred saving instrument in all stages of the hierarchy.

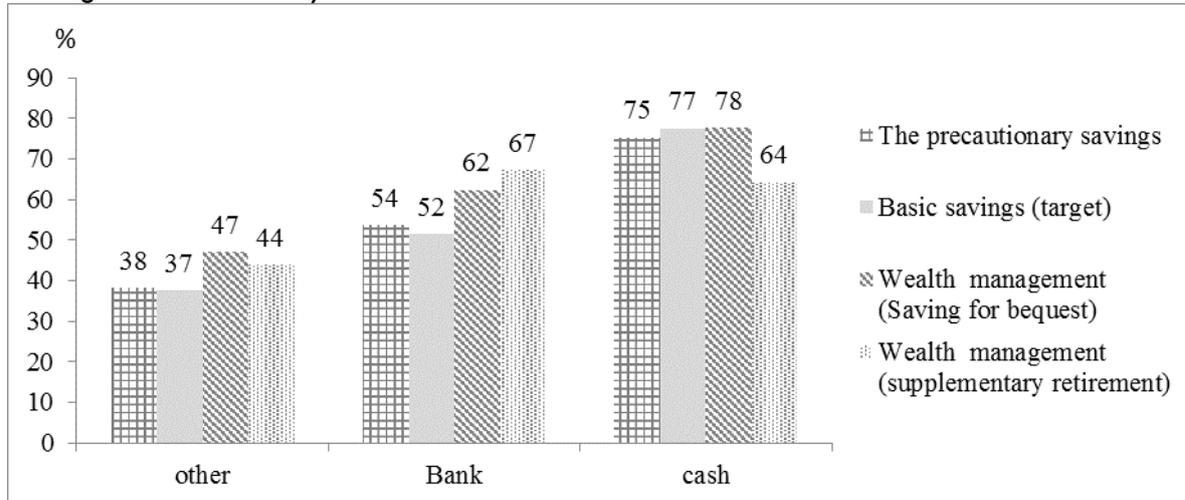


Fig. 5 Saving instruments used according to saving reasons

According to the study I referred to (Venter and Stedall, 2010), the cash is used for current expenses. Even on the last hierarchy stage (Wealth management, realised through saving for bequest and supplementary pension) most households use saving in cash.

CONCLUSIONS

Those who use modern saving instruments have a high level of general and financial education.

The first hypothesis is validated. The main saving instruments are the classical ones, namely bank deposits and cash. Only 39% of the households use modern saving methods.

The second hypothesis is validated. Approximately two thirds of the households prefer to keep their money "under the mattress". Savings in cash are small amounts (their average value is around 300 Euros). This preference is determined on the one hand by the lack of trust in the financial-banking institutions and, on the other hand, by a weak amenity from the point of view of their profitability. The households that opt for saving in cash are mostly those from the rural area and the education level of their head is low.

The third hypothesis is partially validated. The education level does not influence the decision of using modern saving instruments. However, the level of financial education, quantified through the number of banking products used, has a direct influence on the odds of saving through other methods than the classical ones. Other variables that have a positive influence on the odds that a household uses modern saving instruments are: improvement of the financial situation, the number of income earning members, the households' assets, trust in the profitability of these methods. The households are to a higher extent from the urban area and they are willing to a higher extent to take a greater risk.

The lack of financial education, of trust in the banking system, as well as the bank high commissions that lower the profitability, determine a concentration of savings in cash. I believe that through substantiated policies these amounts may be attracted into the banking system.

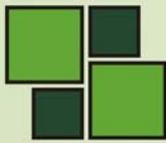
Rising the financial education level is a priority since the objective of financial education is to raise financial literacy levels by teaching new knowledge, skills and attitudes that can bring about changes in money management behaviours. It is also a tool of financial inclusion, enabling people to take greater advantage of the financial services available to them.

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